

REMARKS

This is intended as a full and complete response to the Examiner Interview on April 5, 2007 and the Final Office Action dated January 29, 2007, having a shortened statutory period for response set to expire on April 29, 2007. Please reconsider the claims pending in the application for reasons discussed below.

Claims 1-2, 4-5, 7-11, 13-14, 16-18, 20-22, 24, 27-31, 33-37, and 53-75 remain pending in the application upon entry of this Response. Claims 1-2, 4-5, 7-11, 13-14, 16-18, 20-22, 24, 27-31, 33-37, and 53-75 were indicated to be rejected in the Final Office Action by the Examiner. However, during a subsequent telephonic interview with the Applicant on April 5, 2007, the Examiner has indicated that claims 14, 16-18, 20-22, 24, 54-61, and 63-75 have been allowed, and claims 1-2, 4-5, 7-11, 13, 27-31, 33-37, 53, and 62 stand rejected, but would be allowable if amended to remove language drawn to the bis(2,4-dimethylpentadienyl) ruthenium. Therefore, claims 1 and 27 have been amended per the Examiner's suggestion. Reconsideration of the rejected claims is requested for reasons presented below.

Claims 1-2, 4, 7-10, 27-30, and 33-36 stand rejected under 35 U.S.C. § 102(e) as being anticipated by *Kim*, U.S. Pub. No. 2002-0173054, herein *Kim*. The Examiner asserts that *Kim* "does contain some of the precursors in paragraph 0030 as C1-C8 alkylcyclopentadienyl ligands which meet the limitations of the claims, such as bis(2,4-dimethyl pentadienyl) ligands." (Final Office Action, page 2). The Applicant respectfully traverses the rejection. While C1-C8 alkylcyclopentadienyl describes a particular genus of ligands, bis(2,4-dimethyl pentadienyl) describes a ligand specie that belongs to a different genus of ligands than alkylcyclopentadienyl. However, in order to move prosecution forward, the Applicant has amended claims 1 and 27 as suggested by the Examiner.

Therefore, *Kim* does not teach, show, or suggest a method for forming a ruthenium layer on a substrate, comprising positioning a substrate within a process chamber, and exposing the substrate sequentially to a ruthenium-containing compound and a reducing gas during an atomic layer deposition process to form a ruthenium material on the substrate, wherein the ruthenium-containing compound is selected from

the group consisting of (2,4-dimethylpentadienyl) ruthenium (cyclopentadienyl), (2,4-dimethylpentadienyl) ruthenium (methylcyclopentadienyl), (2,4-dimethylpentadienyl) ruthenium (ethylcyclopentadienyl), (2,4-dimethylpentadienyl) ruthenium (isopropylcyclopentadienyl), derivatives thereof, and combinations thereof, as recited in claim 1, and claims dependent thereon.

Also, *Kim* does not teach, show, or suggest a method for forming a layer comprising ruthenium on a substrate within a process chamber, comprising a) exposing a substrate to a ruthenium-containing compound to form a ruthenium-containing layer thereon, wherein the ruthenium-containing compound comprises a 2,4-dimethylpentadienyl ligand and a second ligand selected from the group consisting of cyclopentadienyl, methylcyclopentadienyl, ethylcyclopentadienyl, propylcyclopentadienyl, and derivatives thereof, b) purging the process chamber with a purge gas, c) exposing the substrate to a reducing gas to form a ruthenium-containing layer material thereon, and d) purging the process chamber with the purge gas, as recited in claim 27, and claims dependent thereon.

Withdrawal of the rejection is respectfully requested by the Applicant.

Claims 5, 13, 31, 53, and 62 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Kim* in view of *DelaRosa et al.*, U.S. Pat. No. 6,527,855, herein *DelaRosa*. The Applicant respectfully traverses the rejection.

Kim has been discussed and distinguished above. *DelaRosa* provides no further disclosure to overcome the shortcomings of *Kim*.

Therefore, *Kim* and *DelaRosa*, alone or in combination, do not teach, show, or suggest a method for forming a ruthenium layer on a substrate, comprising positioning a substrate within a process chamber, and exposing the substrate sequentially to a ruthenium-containing compound and a reducing gas during an atomic layer deposition process to form a ruthenium material on the substrate, wherein the ruthenium-containing compound is selected from the group consisting of (2,4-dimethylpentadienyl) ruthenium (cyclopentadienyl), (2,4-dimethylpentadienyl) ruthenium (methylcyclopentadienyl), (2,4-dimethylpentadienyl) ruthenium (ethylcyclopentadienyl), (2,4-dimethylpentadienyl) ruthenium (isopropylcyclopentadienyl), derivatives thereof,

and combinations thereof, as recited in claim 1, and claims 5, 13, and 53 dependent thereon.

Also, *Kim* and *DelaRosa*, alone or in combination, do not teach, show, or suggest a method for forming a layer comprising ruthenium on a substrate within a process chamber, comprising a) exposing a substrate to a ruthenium-containing compound to form a ruthenium-containing layer thereon, wherein the ruthenium-containing compound comprises a 2,4-dimethylpentadienyl ligand and a second ligand selected from the group consisting of cyclopentadienyl, methylcyclopentadienyl, ethylcyclopentadienyl, propylcyclopentadienyl, and derivatives thereof, b) purging the process chamber with a purge gas, c) exposing the substrate to a reducing gas to form a ruthenium-containing layer material thereon, and d) purging the process chamber with the purge gas, as recited in claim 27, and claims 31 and 62 dependent thereon.

Withdrawal of the rejection is respectfully requested by the Applicant.

Claims 11 and 37 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Kim*. The Applicant respectfully traverses the rejection.

Kim has been discussed and distinguished above.

Therefore, *Kim* does not teach, show, or suggest a method for forming a ruthenium layer on a substrate, comprising positioning a substrate within a process chamber, and exposing the substrate sequentially to a ruthenium-containing compound and a reducing gas during an atomic layer deposition process to form a ruthenium material on the substrate, wherein the ruthenium-containing compound is selected from the group consisting of (2,4-dimethylpentadienyl) ruthenium (cyclopentadienyl), (2,4-dimethylpentadienyl) ruthenium (methylcyclopentadienyl), (2,4-dimethylpentadienyl) ruthenium (ethylcyclopentadienyl), (2,4-dimethylpentadienyl) ruthenium (isopropylcyclopentadienyl), derivatives thereof, and combinations thereof, as recited in claim 1, and claim 11 dependent thereon.

Also, *Kim* does not teach, show, or suggest a method for forming a layer comprising ruthenium on a substrate within a process chamber, comprising a) exposing a substrate to a ruthenium-containing compound to form a ruthenium-containing layer thereon, wherein the ruthenium-containing compound comprises a 2,4-

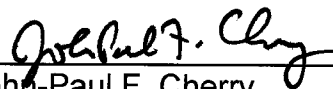
dimethylpentadienyl ligand and a second ligand selected from the group consisting of cyclopentadienyl, methylcyclopentadienyl, ethylcyclopentadienyl, propylcyclopentadienyl, and derivatives thereof, b) purging the process chamber with a purge gas, c) exposing the substrate to a reducing gas to form a ruthenium-containing layer material thereon, and d) purging the process chamber with the purge gas, as recited in claim 27, and claim 37 dependent thereon.

Withdrawal of the rejection is respectfully requested by the Applicant.

In conclusion, the references cited by the Examiner, alone or in combination, do not teach, show, or suggest the claimed invention.

Having addressed all issues set out in the Final Office Action, the Applicant respectfully submits that the claims are in condition for allowance and respectfully request that the claims be allowed.

Respectfully submitted,



John-Paul F. Cherry
Registration No. 57,323
PATTERSON & SHERIDAN, L.L.P.
3040 Post Oak Blvd., Suite 1500
Houston, TX 77056
Telephone: (713) 623-4844
Facsimile: (713) 623-4846
Agent for the Applicant